

Approved by Durham Town Council

Date Approved – 10/17/22

Produced by the Climate Action Plan Task Force

Through the partnership with ICLEI – Local Government for Sustainability (ICLEI)



Acknowledgments

Climate Action Plan Task Force

- Rafidah Rahman – 2022-2023 UNH Sustainability Fellow
- Cathy Fletcher – 2021-2022 UNH Sustainability Fellow
- Jennifer Andrews – Project Director, UNH Sustainability Institute
- Nat Balch – Chair, Durham Energy Committee
- Jim Lawson – Member, Durham Town Council/Energy Committee
- Todd Selig – Administrator, Town of Durham

Durham Officials and Staff

- Durham, NH Leadership Team;
- Rich Reine, Public Works Director;
- Rene Kelley, Police Chief;
- David Emanuel, Fire Chief;
- Rachel Gasowski, Parks & Recreation Director;
- Sheryl Bass, Library Director;
- Luke Vincent, IT Manager;
- Gail Jablonski, Business Manager;
- Lorrie Pitt, Town Clerk/Tax Collector;
- Rachel Dean, Deputy Town Clerk/Tax Collector;
- James Rich, Assessor;
- Audrey Cline, Code/Zoning/Health Officer;
- Michael Behrendt, Director of Planning & Community Development.

Community Stakeholders

- Conservation Commission
- Agricultural Commission
- Land Stewardship Subcommittee
- Integrated Waste Management Advisory Committee
- Energy Committee
- Town Council

This Climate Action Plan was developed using a template provided by ICLEI – Local Governments for Sustainability, USA. This template and its appendices were published in April 2018.

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Executive Summary

This Climate Action Plan establishes a clear course of action for local efforts in Durham, New Hampshire, toward a reduction in GHG emissions of 2019 levels by 42.8% by 2030, and achieving zero emissions by 2050. The Climate Action Plan is a framework for developing and implementing actions to achieve these targets.

It is organized across five action areas—buildings, transportation, energy supply, waste and natural resources—and identifies concrete emissions reduction strategies that the Town will work to implement and encourage, working with residents, businesses, and local stakeholders including the Oyster River School District and the University of New Hampshire. These strategies were based on local community input as well as research into best practices being pursued in communities across the state, region, nation, and the globe. The Town of Durham will report on progress and update the action strategies every two years.

It is important to note that while UNH and the Town are making concrete efforts to reduce their GHG emissions, it is largely up to community members whether or not we meet our goals.

When excluding transportation emissions, which are difficult to estimate by user, emissions by user were as follows: UNH (42.4%), Residential (30.4%), Commercial (22.1%), Oyster River Cooperative School District (ORCSD) (2.9%), and Municipal (2.2%). As UNH, the municipality, and ORCSD directly account for 47.5% of non-transportation emissions, the remaining 52.5% of emissions are in the hands of the community.

Introduction

Climate change is perhaps the greatest environmental challenge of the 21st century. It poses a serious threat not just to New Hampshire's natural resources, but also to our health, welfare, critical infrastructure, and economic interests. Climate change also presents huge opportunities for creating a healthier, safer, and more equitable zero-carbon world. Durham has an unparalleled opportunity to make changes in ways that increase sustainability, resiliency, and benefit all residents. Scientists expect that with the current trends in fossil fuel use, Americans may see more intense heat waves, droughts, rainstorms, floods, wildfires, and landslides in the future. These impacts could drag down our economy, stress our natural resources, and worsen inequities facing many Americans. Action is required at all levels, and local governments such as Durham have a unique role to play in building low-carbon communities. However, government action alone is not enough to address climate change; everyone must be a part of the solution.

The Creation of the Climate Action Plan

Purpose

The 2014 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), written by a panel of hundreds of climate experts and scientists and approved by a team of external reviewers, states unambiguously that anthropogenic or "man-made" greenhouse gas (GHG) emissions are causing global climate change. For this reason, Durham has joined an increasing number of local governments committed to addressing climate change at the local level, in particular through its commitment to the Global Covenant of Mayors for Climate and Energy. Durham recognizes the risk that climate change poses to its residents and is acting now to reduce the GHG emissions of both its government operations community-at-large through the innovative programs laid out in this Climate Action Plan. Furthermore, it is recognized that Durham needs to address existing climate risks such as sea level rise, increased flooding and drought conditions, and increased storm severity, among other anticipated changes, through enhanced resiliency and by adapting its systems and infrastructure to new conditions. Ultimately, local action is needed to reduce Durham's contribution to the problem of climate change and adapt to its current and future effects. This Climate Action Plan takes advantage of approaches and policies that our local government is uniquely positioned to implement

to work towards these efforts both for the municipality as a distinct entity and to promote action by individuals and businesses within the town.

By creating a clear course of action, our Climate Action Plan drives and coordinates local efforts toward a reduction in GHG emissions of 2019 levels by 42.8% by 2030, and achieving zero emissions by 2050. The Climate Action Plan is a framework for developing and implementing actions to achieve these targets.

In addition to addressing mitigation concerns as outlined in this Climate Action Plan, a separate 2017 Hazard Mitigation Plan is currently in effect, which highlights the vulnerability of Durham to climate hazards and the strategies proposed to respond to these vulnerabilities thereby increasing our local resilience to future climate-related challenges. The 2017 Hazard Mitigation Plan was scheduled for updating in 2021 but due to the effects of the COVID-19 pandemic and delays in the receipt of Federal funds necessary to support the cost of the local update, followed by required bureaucratic processes at the NH Office of Homeland Security & Emergency Management and Office of the NH Governor in allocating said funds to Durham, the update will commence on September 6, 2022, and is anticipated to be completed by mid-2023. A related draft Climate Action Chapter of the Durham Master Plan is now under development and a recently completed 2022 study evaluating the impacts of sea level rise on groundwater levels and water quality/septic systems & critical infrastructure in Durham will help to inform the update to the 2022 Hazard Mitigation Plan.

We recognize that ultimately, no one strategy will undo these challenges, but the implementation of multi-faceted strategies may set Durham on the right path. We plan to outline goals and document progress as outlined below.

Development Process

Home to the University Of New Hampshire (UNH), Durham has leveraged its relationship with the university to drive forward its sustainability efforts. UNH is a leader in its own right, updating its Climate Action Plan, known as WildCAP, in 2021 in which it continued outlining how the university would reduce its Scope 1 and 2¹ emissions from 2019 levels by 50% by 2030. In addition, the UNH Sustainability Institute has been connecting undergraduate students and post-baccalaureates from universities across the US to organizations to work on sustainability initiatives. Durham has hosted a sustainability

¹ UNH defines Scope 1 emissions as “All direct, on-site emissions that result from facilities operations. For UNH, this includes emissions from burning fossil fuels to heat and provide electricity for our buildings, run our power plant, and fuel our fleet vehicles; applying fertilizers and using refrigerants; and cultivating livestock” and Scope 2 emissions as “Off-site emissions from utility generation of electricity, steam, or chilled water. For UNH this includes the electricity we purchase.”

fellow each summer since 2018, and began keeping fellows on part-time throughout the year beginning in the fall of 2020. This partnership between Durham and the UNH Sustainability Institute allows Durham to access UNH’s technical expertise in support of various sustainability efforts.

This plan was developed by a Climate Action Plan Task Force, composed of individuals from Town departments, committees, and commissions, as well as the UNH Sustainability Institute (see “Acknowledgements” for a full list of contributors). The Task force initially created draft goals and actions that were informed by the 2015 Durham Master Plan, 2019 Community-Wide Greenhouse Gas Inventory, and 2017 Hazard Mitigation Plan (to be updated as described below commencing in September 2022). The Task Force solicited feedback from the community through meetings with Town committees, commissions, and department heads, in-person events such as Earth Day, and online surveys. This feedback helped shape the final version of this plan, making it more useful for the Durham community.

While this Plan includes overarching goals out to 2030, the *actions* within this Plan are intended to be completed by 2024. As required by the Global Covenant of Mayors, Durham will provide updates every two years after the approval of this Plan and revise actions as necessary.

It is important to note that while UNH and the Town are making concrete efforts to reduce their GHG emissions, it is largely up to community members whether or not we meet our goals. When excluding transportation emissions, which are difficult to estimate by user, emissions by user were as follows: UNH (42.4%), Residential (30.4%), Commercial (22.1%), Oyster River Cooperative School District (ORCSD) (2.9%), and Municipal (2.2%). As UNH, the municipality, and ORCSD directly account for 47.5% of non-transportation emissions, the remaining 52.5% of emissions are in the hands of the community. Even if UNH and the municipality reach the goals they are able to directly control, Durham will need community support to reach the goals of the community.

Climate Action Plan Elements

While Durham has already begun to reduce its GHG emissions and climate risk in meaningful ways through a variety of actions, this plan outlines a deliberate and comprehensive approach to continuing these efforts. It offers a framework to document, coordinate, measure, and adapt efforts moving forward. This Plan covers goals and actions for reducing GHG emissions resulting from local government and community-wide activities within Durham (i.e., mitigation-focused). The separate 2017 Hazard

Mitigation Plan (and subsequent update soon to get underway) outlines current climate hazards in Durham to increase its resilience (i.e., adaptation-focused).

Goals and actions to reduce GHG emissions are organized into five focus areas. While are not all-inclusive, they provide a structural framework to organize goals and actions under this and subsequent versions of this Plan.

1. Buildings – promoting energy efficiency and conservation in buildings

- Encouraging the shift to resilient and efficient buildings that minimize the GHG emissions required to heat, cool, and power them
 - I. Green Infrastructure (low-impact development)
 - II. Energy Efficiency (energy efficiency and conservation)
 - III. Green Equipment (energy-efficient equipment)
 - IV. Resilient Buildings (buildings resilient to climate impacts ex: intense storms, and heat)

2. Transportation - providing a range of transportation options and promoting active transportation (walking, biking)

- Creating a safe, connected, and accessible transportation system that prioritizes low-carbon transportation methods and seeks to reduce GHG emissions.
 - I. Active transportation (Walking, biking)
 - II. Electric vehicles (promoting electric vehicles and transfer stations)
 - III. Land use (impacts on transportation: zoning, bike lanes, EV charging)
 - IV. Public transportation (expanding and encouraging the use of public transportation)
 - V. Vehicles (improving vehicle efficiency; reducing use)
 - VI. Design (resilient design and improvements for transportation infrastructure)

3. Energy Supply – providing green energy choices and an adequate supply for future energy demand

- Creating a reliable, green, and adequate energy supply to support current and future energy needs.
 - I. Renewable Energy (expanding renewable energy generation)
 - II. Resilient Energy (reliable energy systems)

4. Solid Waste and Resource Consumption – reducing and diverting waste; conserving resources

- Promoting processes that reduce the amount of waste sent to the landfill, encourage reduced water usage, and support locally sourced products.
 - I. Local Food (local food and agriculture)
 - II. Purchasing (purchasing practices: Energy Star)
 - III. Waste (waste reduction and diversion: composting)
 - IV. Water Use (water use reduction and efficiency)
 - V. Storm water (storm water management)




5. Natural Resources – protecting water and other natural resources

- Preserving and enhancing the health of Durham’s waterways, agriculture, wildlife, and open spaces.
 - I. Agricultural Lands (healthy, productive agricultural lands)
 - II. Open Space (preserving green and open space)
 - III. Sustainable & Resilient Landscapes (biodiversity, pollinator protection, resistance to erosion)
 - IV. Tree Canopy (tree canopy and forest maintenance and management)
 - V. Water Resources (protecting water resources)
 - VI. Storm water management





Summary of Goals and Actions

The Climate Action Plan offers a robust set of goals and actions that will address GHG reductions. Each goal and action were created and reviewed by a group of stakeholders who considered technology limitations, funding constraints, public support, the feasibility of implementation, environmental justice considerations, and other barriers.






Calculating expected emissions reductions for each goal requires making assumptions about the degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign exact reduction totals to each goal or action. To address this uncertainty and provide a simple but useful reference for reduction potential, the following symbols and associated ranges represent the emission reductions associated with each objective and its strategies.













| Symbol | GHG Reduction |
|---|-----------------------------------|
|  | 0-5,000 tCO ₂ e |
|  | 5,001-10,000 tCO ₂ e |
|  | 10,001 or more tCO ₂ e |




In addition to measuring the GHG reduction potential, each focus area is also evaluated for other benefits such as jobs and prosperity, equity and justice, environmental conservation, and public health. The symbols below will indicate which co-benefits a measure will generate.

| Symbol | Co-Benefit |
|---|---|
|  | High potential to support jobs and prosperity |
|  | High potential to advance equity and justice |
|  | High potential to improve local environmental quality |
|  | High potential to improve health |

Summary of Goals

| Goal | Supporting Actions | Supports Mitigation (M) or Adaptation (A) | Benefits | Reduction Potential by 2030 |
|---|--------------------|---|---|---|
| Buildings | | | | |
| B.1 – In residential and commercial buildings, electrify stationary energy sources and increase energy efficiency to compensate for this increased energy demand by 2030. | B.1.1 – B.1.2 | M |  |  |
| B.2 – Diversify Durham’s housing stock by 2030. | B.2.1 | M |  | Not Applicable (see description) |
| B.3 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. | B.3.1 | M |  |  |
| Transportation | | | | |
| T.1 – Transition 70% of the police fleet to hybrid vehicles by 2024, and 100% of municipal vehicles to hybrid or electric vehicles by 2030, as technology and the market allow. | T.1.1- T.1.2 | M |  |  |

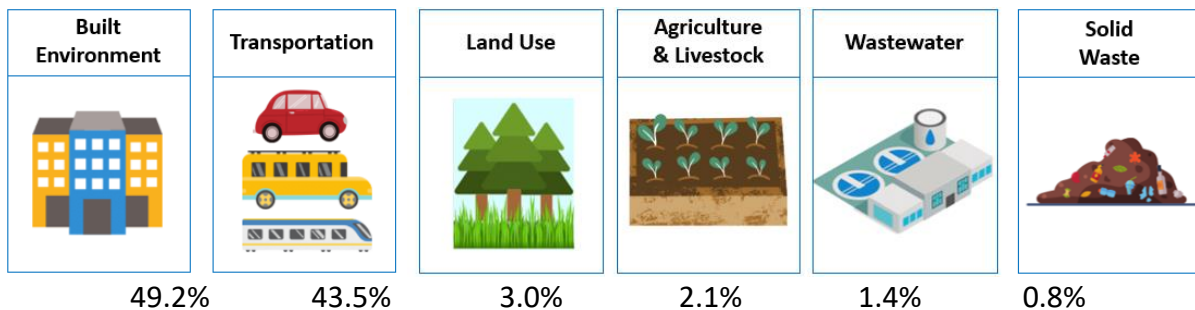
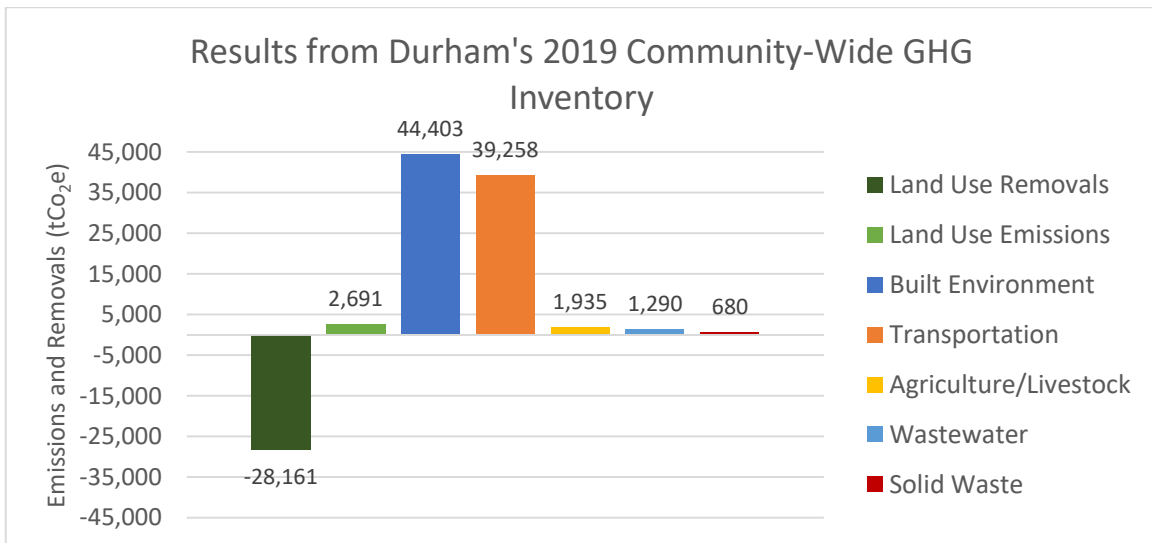
| T.2 – Increase bicycle connectivity to the downtown core and enhance the safe pedestrian experience by 2024. | T.2.1- T.2.2 | M |  |  |
|--|--------------------|---|---|---|
| T.3 – Reduce single-occupancy vehicle miles traveled by 5% by 2024 and 15% by 2030. | T.3.1- T.3.4 | M |  |  |
| T.4 – Increase the share of electric vehicles and the number of public charging stations in Durham by 2030. | T.4.1- T.4.2 | M |  |  |
| T.5 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. | T.5.1 | M |  |  |
| Goal | Supporting Actions | Supports Mitigation (M) or Adaptation (A) | Benefits | Reduction Potential by 2030 |
| Energy Supply | | | | |
| E.1 – Provide the option of 100% renewable energy source for all residents by 2024. | E.1.1- E.1.3 | M |  |  |
| E.2 – Source all municipal buildings from 100% renewable energy by 2024. | E.2.1 | M |  |  |
| E.3 – Ensure an adequate renewable energy supply while accounting for increased demand from the transportation sector and impacts from climate change by 2030. | E.3.1 | M, A |  | Not Applicable (see description) |
| Solid Waste and Resource Consumption | | | | |
| SW.1 – Reduce the tonnage, and send it to the landfill by 10% per household by 2024 with the goal over time of meeting and exceeding the NH state diversion rates. | SW.1.1- SW1.2 | M |  |  |
| Natural Resources | | | | |
| NR.1 – Increase the amount of municipal-owned land that meets the Conservation/Open Space Land criteria by 2024. | NR.1.1- NR.1.2 | M, A |  | Not Applicable (see description) |

| | | | | |
|---|--------|------|---|---|
| NR.2 – Maintain Durham’s capability of sequestering carbon through land use practices through 2024. | NR.2.1 | M, A |  | Not Applicable (see description) |
| NR.3 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. | NR.3.1 | M |  |  |

In addition to listing actions, the Plan discusses how each action will be implemented via timelines, financing, and assignment of responsibilities to departments, staff, or community partners where known. It also provides the anticipated GHG reductions as well as benefits for public health, equity and justice, jobs and prosperity, and environmental quality.

Durham's Carbon Footprint

In 2021, Durham's Community-Wide Greenhouse Gas Inventory was completed. Using 2019 data, this inventory included the measurement of GHG emissions and removals from the following sectors: Built Environment, Transportation, Wastewater, Solid Waste, Agriculture/Livestock, and Land Use. Units of measurement are in metric tons of carbon dioxide equivalents (noted as tCO₂e), which is the universal unit for comparing emissions of different GHGs in terms of the global warming potential of one unit of carbon dioxide. The results from this inventory are provided below.



Durham has committed to:



Reducing 2019 greenhouse gas emissions by **35.5%** by **2030**



Achieving **zero** greenhouse gas emissions by **2050**

This goal was set to meet the ambition of the United States' April 2021 nationally determined contribution made in line with the Paris Agreement, as required by the Global Covenant of Mayors. Durham used a straight-line path to determine how much the Town would have to reduce emissions by 2030 to meet zero emissions by 2050.

Science-based GHG reduction target methodology considers what target would represent a fair share of the 50% global per capita emissions reduction by 2030, identified in the IPCC Special Report on Global Warming of 1.5°C, largely based on the country in which the town is located. Durham considered creating a science-based target, and it was estimated that Durham would have to reduce its per capita emissions by approximately 62.8% by 2030. Based on the smaller size of Durham, limited funding and staffing to drive initiatives, and caution towards setting a too-ambitious goal that would feel unrealistic to residents, Durham has decided to continue along the straight-line path to zero emissions at this time.

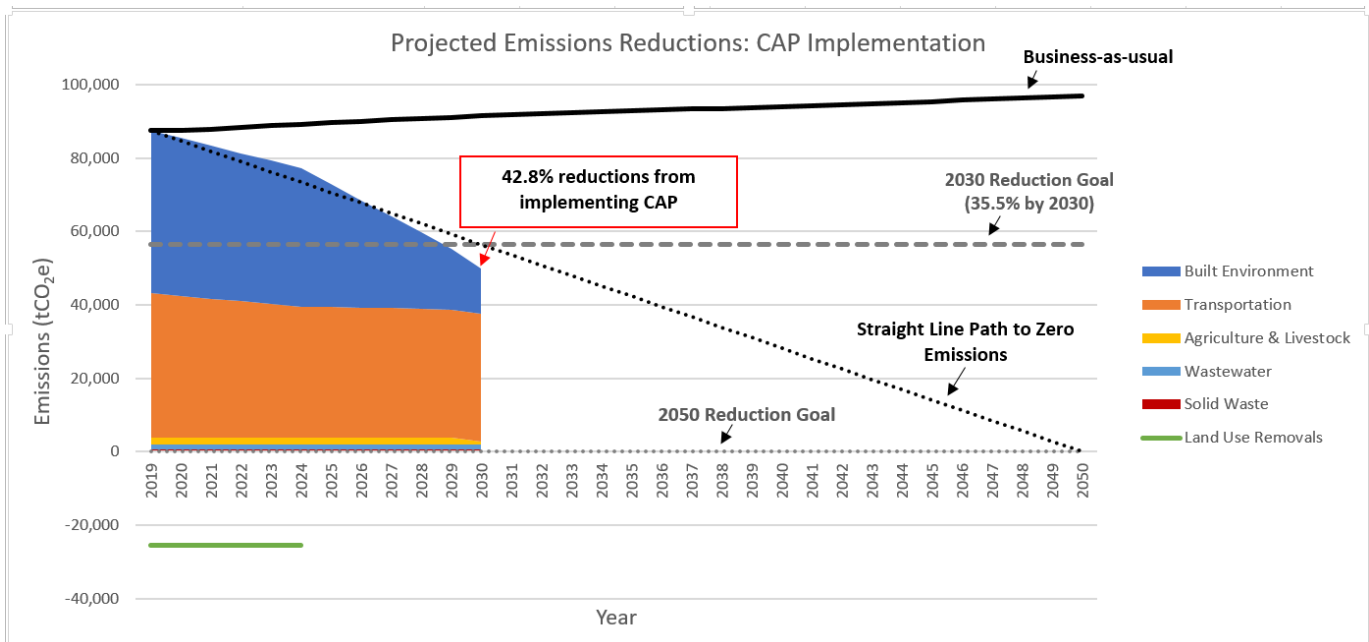
What does “zero” greenhouse gas emissions mean?

Durham is defining “zero” GHG emissions as zeroing all emissions **outside of land use**. By doing this, Durham is acknowledging trees' role in regulating the earth's natural carbon cycle as well as the importance of nature-based solutions in mitigating the effects of climate change. Durham's most recent GHG inventory found that Durham's forests and trees sequestered 28,161 tCO₂e per year – approximately 31.2% of Durham's emissions!

Durham intends to drive forward initiatives that will:

| | |
|---|-------------------------------|
| - | + |
| Minimize Emissions from | Maximize Removals from |
| Built Environment Transportation Solid Waste Wastewater Agriculture/Livestock | Land Use |

The combination of measures that Durham has already implemented, are currently planned, and are presented through this Climate Action Plan are designed to achieve the 2030 and 2050 targets. Reductions rely on the best information currently available pertaining to population forecasts, future changes to building codes, and vehicle fuel efficiency standards among other information. Durham has also completed an emissions forecast based on projections of current data and expected future trends. The emissions forecast is a “Business-As-Usual” forecast, a scenario estimating future emissions levels if no further local action (i.e. projects within this Climate Action Plan) were to take place (see Appendix II for assumptions and calculations). The forecast indicates that if we do not take action, GHG emissions will continue to increase. Below is a sample of the anticipated GHG reduction measures compared to the Business-As-Usual forecast.



Climate Risks and Vulnerabilities – Durham’s 2017 Hazard Mitigation Plan

In addition to addressing mitigation concerns as outlined in this Climate Action Plan, there is also a separate 2017 Hazard Mitigation Plan, which highlights Durham's vulnerability to climate hazards and the strategies proposed to combat these vulnerabilities, thereby improving our local resilience to future climate-related challenges.

The 2017 Hazard Mitigation Plan was scheduled for updating in 2021 but due to the effects of the COVID-19 pandemic and delays in the receipt of Federal funds necessary to support the cost of the local update, followed by required bureaucratic processes at the NH Office of Homeland Security & Emergency Management and the Office of the NH Governor in allocating said funds to Durham. The 2022 Hazard Mitigation Plan, outlining Durham’s Risk and Vulnerability Assessment, commenced on September 6, 2022, and is anticipated to be completed by mid-2023.

A draft Climate Action Chapter of the Durham Master Plan now under development and a recently completed 2022 study evaluating the impact of sea level rise on groundwater levels, water quality, septic systems, and critical infrastructure in Durham will help inform the update to the 2017 Hazard Mitigation Plan.

Preparing for the impacts of climate change is a complex challenge. Despite the uncertainty of future global emissions levels, climate science is evolving. Therefore, Durham’s preparedness strategy needs to be an evolving one as well.

As climate conditions change, proactive planning can be more cost-effective than reactive responses to damage after the fact, and can assist in maintaining the functionality of town infrastructure and systems. It may involve anticipating the need for later modifications or operational changes or designing for projected foreseeable conditions. In other situations, the uncertainty surrounding the timing and magnitude of future impacts may make it more cost-effective to design the project so that future modifications can be made as soon as the potential impact becomes more apparent. For example, a current roadway storm water system can be designed to allow future modifications to accommodate additional precipitation. To be most effective, climate change preparedness requires decision-making that is specific to each project and program, and that is informed by a broad understanding of the impacts of climate change. These considerations are included as part of the Town's 2017 Hazard Mitigation Plan.

The most vulnerable populations are in general at greater risk of climate change impacts and often have the fewest resources to cope with these changes. In the aftermath of extreme events, it is imperative to foster resilience in more vulnerable populations and support their recovery. To enhance equity, climate change preparedness strategies should:

1. Identify and prioritize measures that can be used to mitigate the effects of climate change on vulnerable populations.
2. Ensure vulnerable populations' input and perspectives are taken into account.

The Path Ahead

The Climate Action Plan is organized into five focus areas as listed and described in the table below. Each focus area has associated goals, created based on consideration of Durham’s 2015 Master Plan goals, 2019 Community-Wide Greenhouse Gas Inventory findings, and 2017 Risk and Vulnerability Assessment (to be updated commencing in September 2022). Under each goal are actions intended to be completed by the next Climate Action Plan update in 2024.

| Focus Area | Description |
|--------------------------------------|---|
| Buildings | Promoting energy efficiency and conservation in buildings |
| Transportation | Providing a range of transportation options and promoting active transportation (i.e., walking, biking) |
| Energy Supply | Providing green energy choices and an adequate supply for future energy demand |
| Solid Waste and Resource Consumption | Reducing and diverting waste; Conserving resources |
| Natural Resources | Protecting water and other natural resources |

Calculations and assumptions for GHG reduction potential for the following sections can be found in Appendix I. In total, these goals and actions are expected to reduce emissions by up to 11.79% by 2024, and up to 42.78% by 2030.

1. Buildings

Promoting energy efficiency and conservation in buildings

- Encouraging the shift to resilient and efficient buildings that minimize the GHG emissions required to heat, cool, and power them
- Subcategories:
 - I. Green Infrastructure (low-impact development)
 - II. Energy Efficiency (energy efficiency and conservation)
 - III. Green Equipment (energy-efficient equipment)
 - IV. Resilient Buildings (buildings resilient to climate impacts ex: intense storms, and heat)

Energy consumed in buildings accounts for 50.7% of Durham’s total GHG emissions (excluding land use). Decreasing energy use and improving building efficiency will contribute significantly to achieving Durham’s GHG reduction target. This section focuses on opportunities to retrofit existing buildings and ensure that future activities are compatible with our community’s climate protection goals.

| Goal B.1 – Buildings | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|--|--------------------------|---|
| In residential and commercial buildings, electrify stationary energy sources and increase energy efficiency to compensate for this increased energy demand by 2030. | | Not Estimated* | 16,151 tCO ₂ e |
| Action Number | Action | Lead Actor | Metric |
| B.1.1 | Incorporate an educational campaign about energy efficiency/reduction opportunities in existing residential buildings by 2024. | Energy Committee | Campaign establishment |
| B.1.2 | Identify ways to gather Town-level, rather than current county-level, residential energy data to estimate the impact of energy efficiency initiatives by 2024. | Sustainability Fellow | Database determined and protocols for gathering established |

**Due to the amount of time necessary to electrify energy sources, it is difficult to estimate this goal’s anticipated progress for 2024 at this time. Although electrification still is emitting GHGs, the grid is less carbon intensive than stationary fuels (ex: a gallon of gas) and the share of fossil fuel-based energy is expected to decrease.*

| Goal B.2 – Buildings | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|--|---|--|
| Diversify Durham’s housing stock by 2030. | | Not Applicable** | |
| Action Number | Action | Lead Actor | Metric |
| B.2.1 | Evaluate changes needed in Durham (ex: zoning and other means) to allow for a broader variety of modestly sized, affordably-priced, energy efficient housing types that are proximate to the urban core by 2024. | Workforce Housing Task Force & Planning Dept. | Summary of necessary changes completed |

***Single-family homes tend to have higher emissions and a higher overall cost due to them being physically larger than smaller multifamily or apartment homes. Increasing the diversity of units within Durham not only provides opportunities for lower emissions due to smaller unit sizes, and in cases of new construction, more stringent and efficient standards, but it also expands the number of households that can live in Durham due to the lower costs associated with smaller units. While it is difficult to estimate GHG emissions associated with this goal, it is still essential in Durham to work towards an equitable place to live.*

| Goal B.3 – Buildings | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|--|--------------------------|--|
| Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. | | Not Estimated*** | 9,115.05 tCO ₂ e |
| Action Number | Action | Lead Actor | Metric |
| B.3.1 | Partner with UNH to identify opportunities for the Town to emission-reduction initiatives by 2024. | Sustainability Fellow | Partnership established and opportunities determined |

****Due to this being a longer-term (i.e., 2030) goal, and considering emission-reduction techniques are likely to have a non-linear impact on emissions, it is difficult to estimate this goal’s anticipated progress for 2024 at this time.*

2. Transportation

Providing a range of transportation options and promoting active transportation (i.e., walking, biking)

- Creating a safe, connected, and accessible transportation system that prioritizes low-carbon transportation methods and seeks to reduce GHG emissions.
- Subcategories:
 - I. Active transportation (Walking, biking)
 - II. Electric vehicles (promoting electric vehicles and transfer stations)
 - III. Land use (land use decisions impacting transportation: zoning, bike lanes, EV charging)
 - IV. Public transportation (expanding and encouraging the use of public transportation)
 - V. Vehicles (improving vehicle efficiency; reducing use)
 - VI. Design (resilient design and improvements for transportation infrastructure)

Emissions from transportation are a common sight to nearly everyone in Durham. Besides emitting GHGs, transportation fossil fuels also produce a host of criteria air pollutants when combusted, reducing local air quality and affecting our health. Transportation, including regional drive-through traffic, accounts for 44.8% of Durham’s total GHG emissions (excluding land use). This section focuses on programs and policies to reduce emissions from transportation and includes design-oriented approaches as well as the expansion of alternative modes such as walking, biking, or public transportation in Durham.

Summary of Actions

| Goal T.1 – Transportation | Reduction Potential 2024 | Reduction Potential 2030 | |
|--|--------------------------|--------------------------|--------|
| Transition 70% of the police fleet to hybrid vehicles by 2024, and 100% of municipal vehicles to hybrid or electric vehicles by 2030, as technology and the market allows. | 38.07 tCO ₂ e | 54.39 tCO ₂ e | |
| Action Number | Action | Lead Actor | Metric |

| | | | |
|-------|---|-------------------------------|--|
| T.1.1 | Purchase new hybrid police vehicles to replace old vehicles on an annual basis, and continue to filter vehicles downward for uses by other departments. | Police Department | Number of vehicles |
| T.1.2 | Review hybrid and electric vehicle options in the market for all other municipal vehicles on an annual basis. Reevaluate action by 2024. | Public Works, Fire Department | Updated list of options with each new purchase |

| Goal T.2 – Transportation | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|--|--|------------------------------|
| Increase bicycle connectivity to the downtown core and enhance the safe pedestrian experience by 2024. | | 437.83 tCO ₂ e | 437.83 tCO ₂ e* |
| Action Number | Action | Lead Actor | Metric |
| T.2.1 | Install 6500 feet (1.23 miles) of bike-sharing lanes on Madbury Road by 2024. | Administrator’s Office | Length of bike sharing lanes |
| T.2.2 | Evaluate how the municipal, university, and NGO trails can be better connected to Durham’s downtown by 2024. | Land Stewardship Subcommittee and Land Stewardship Coordinator | Map and/or report created |

**Due to the short-term nature of this goal (i.e., completed by 2024), it is assumed that the potential reduction by 2030 is the same as the reduction by 2024 until a longer-term goal is established.*

| Goal T.3 – Transportation | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|---|--------------------------|--------------------------------------|
| Reduce single-occupancy vehicle miles traveled by 10% by 2024. | | 3,304 tCO ₂ e | 3,304 tCO ₂ e** |
| Action Number | Action | Lead Actor | Metric |
| T.3.1 | Partner with UNH to locate increased graduate housing stock close to campus by 2024. | Administrator’s Office | Partnership established |
| T.3.2 | Partner with UNH to evaluate how the Wildcat bus service can better serve Durham residents by 2024. | Sustainability Fellow | Partnership established |
| T.3.3 | Partner with UNH to incorporate an educational campaign about active/public transportation options by 2024. | Energy Committee | Partnership and campaign established |

| | | | |
|-------|---|-----------------------|-------------------------------------|
| T.3.4 | Partner with UNH to implement a community bike sharing program by 2024. | Sustainability Fellow | Partnership and Program established |
|-------|---|-----------------------|-------------------------------------|

***Due to the short-term nature of this goal (i.e., completed by 2024), it is assumed that the potential reduction by 2030 is the same as the reduction by 2024 until a longer-term goal is established.*

| Goal T.4 – Transportation | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|--|--|--------------------------------|
| Increase the share of electric vehicles and the number of public charging stations in Durham by 2030. Although electrification still is emitting GHGs, the grid is less carbon intensive than stationary fuels (ex: a gallon of gas) and the share of fossil fuel-based energy is expected to decrease. | | Not Estimated*** | Not Estimated*** |
| Action Number | Action | Lead Actor | Metric |
| T.4.1 | Incorporate public input to identify areas to install public charging stations by 2024. | Sustainability Fellow, supported by Energy Committee | High-priority areas identified |
| T.4.2 | Identify local, state, and federal incentives for both electric vehicle ownership and charging station installation for community usage by 2024. | Sustainability Fellow, supported by Energy Committee | Opportunities identified |

****Considering that the increase of EV charging infrastructure is likely to have a non-linear impact on emissions, it is not possible to usefully estimate this goal’s anticipated progress at this time.*

| Goal T.5 – Transportation | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|--|--------------------------|--|
| Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. | | Not Estimated**** | 949.6 tCO ₂ e |
| Action Number | Action | Lead Actor | Metric |
| T.5.1 | Partner with UNH to identify opportunities for the Town to support UNH emission-reduction initiatives by 2024. | Sustainability Fellow | Partnership established and opportunities determined |

*****Due to this being a longer-term (i.e., 2030) goal, and considering emission-reduction techniques are likely to have a non-linear impact on emissions, it is difficult to estimate this goal’s anticipated progress for 2024 at this time.*

3. Energy Supply

Providing green energy choices and an adequate supply for future energy demand

- Creating a reliable, green, and adequate energy supply to support current and future energy needs.
- Subcategories:
 - I. Renewable Energy (expanding renewable energy generation)
 - II. Resilient Energy (reliable energy systems)

Broadly speaking, the use of fossil fuels for energy (including electricity, heating, transportation, and other uses) is the single largest contributor to GHG emissions and climate change. Fossil fuels still supply a considerable share of energy for electricity, heating, transportation, and other energy-producing uses. Emissions from fossil fuel combustion for energy, including transportation, represent 95.5% of the community's total GHG emissions when excluding land use emissions. Energy Production is a cross-cutting focus area in that nearly all activities that take place in the community require energy of some sort. Opportunities exist for citizens and Durham's local government to offset the need for fossil fuels. This focus area is limited to energy production exclusively – goals and actions that focus on end-use energy efficiency are included in other focus areas. The programs and projects within this focus area are designed to spur local government and community investment in renewable energy sources including those that produce electricity, heat, and mobile fuels.

In addition, Durham may experience challenges to its local energy supply due to warmer temperatures and increased electricity demand due to the electrification of products that currently rely on stationary fuel. Peak demand for electricity may increase due to the increased use of air conditioners in Durham, and efficiencies of electricity generation and transmission decrease as air temperatures increase, which further inhibits the ability of electric providers to meet increased demand.

Summary of Actions

| Goal E.1 – Energy Supply | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|--|---|-----------------------------|
| Provide the option of 100% renewable energy source for all residents by 2024. | | 6,081.3 tCO ₂ e | 6,081.3 tCO ₂ e* |
| Action Number | Action | Lead Actor | Metric |
| E.1.1 | Update Durham’s solar ordinance to provide Durham residents with clearer guidance by 2024. | Town Council | Solar ordinance updated |
| E.1.2 | Participate in the Community Power Aggregation Coalition of NH and provide a 100% renewable energy option to Durham residential and commercial customers as a default energy source by 2024. | Energy Committee, and supported by the Administrator’s Office | Program established |
| E.1.3 | Incorporate an educational campaign about green energy opportunities in residential buildings by 2024. | Energy Committee | Campaign established |

| Goal E.2 – Energy Supply | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|---|--|---------------------------|
| Source all municipal buildings from 100% renewable energy by 2024. | | 690.1 tCO ₂ e | 690.1 tCO ₂ e* |
| Action Number | Action | Lead Actor | Metric |
| E.2.1 | Purchase PPA2 (power purchase agreement 2) by 2024. | Sustainability Fellow, and supported by Energy Committee | PPA2 purchased |

**Due to the short-term nature of this goal (i.e., completed by 2024), it is assumed that the potential reduction by 2030 is the same as the reduction by 2024 until a longer-term goal is established.*

| Goal E.3 – Energy Supply | | Reduction Potential 2024 | Reduction Potential 2030 |
|--------------------------|--|--------------------------|--------------------------|
|--------------------------|--|--------------------------|--------------------------|

| Ensure an adequate renewable energy supply while accounting for increased demand from the transportation sector and impacts from climate change by 2030. | | Not Applicable** | |
|--|--|--|----------------------|
| Action Number | Action | Lead Actor | Metric |
| E.3.1 | Evaluate expected changes to energy supply based on an increase in energy demand from electrification (electric vehicles, etc.) by 2024. | Sustainability Fellow, and supported by Energy Committee | Evaluation completed |

***While ensuring an adequate energy supply doesn't equate to GHG emission reductions, it ensures that Durham is resilient to anticipated changes in both energy demand and efficiency levels at increased temperatures.*

4. Solid Waste and Resource Consumption

Reducing and diverting waste; conserving resources

- Promoting processes that reduce the amount of waste sent to the landfill, encourage reduced water usage, and support locally sourced products.
- Subcategories:
 - I. Local Food (local food and agriculture)
 - II. Purchasing (purchasing practices: Energy Star)
 - III. Waste (waste reduction and diversion (composting))
 - IV. Water Use (water use reduction and efficiency)
 - V. Storm water (storm water management)

Durham's solid waste is disposed of at Turnkey Landfill in Rochester, RH. Emissions from decaying putrescible material directly contribute to 0.8% of Durham's total GHG emissions (excluding land use) and contribute to emissions in the Transportation sector via hauling of waste to and from facilities and operating. Additionally, embodied energy within the items that we throw away might be harnessed through the reuse and recycling of materials. It is in Durham's long-term interest to expand recycling facilities and enable the reuse of construction materials and other goods. This chapter focuses on opportunities to reduce waste, reuse materials, and recycle what cannot be reused.

In addition to waste reduction, conserving resources is vital in Durham. Water availability is and has been a vital economic, natural resource, and public health issue in New Hampshire. Warming temperatures, along with decreased rainfall, will worsen droughts and threaten local water supplies. Multi-year droughts challenge water supplies and will intensify as climate change causes reduced rainfall, decreased snowfall, and increased temperatures.

Summary of Actions

| Goal SW.1 – Solid Waste and Resource Consumption | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|---|--|--------------------------|
| Reduce the tonnage, and send it to the landfill by 10% per household by 2024 with the goal over time of meeting and exceeding the NH state diversion rates. | | 24.7 tCO ₂ e | 24.7 tCO ₂ e* |
| Action Number | Action | Lead Actor | Metric |
| SW.1.1 | Incorporate an educational campaign about waste reduction and diversion opportunities by 2024. | Integrated Waste Management Advisory Committee | Evaluation completed |
| SW.1.2 | Implement a solution aimed at addressing the concept of establishing a Durham-wide compost program by 2024. | Integrated Waste Management Advisory Committee and supported by Public Works | Program established |

**Due to the short-term nature of this goal (i.e., completed by 2024), it is assumed that the potential reduction by 2030 is the same as the reduction by 2024 until a longer-term goal is established.*

5. Natural Resources

Protecting water and other natural resources

- Preserving and enhancing the health of Durham’s waterways, agriculture, wildlife, and open spaces.
- Subcategories:
 - I. Agricultural Lands (healthy, productive agricultural lands)
 - II. Open Space (preserving green and open space)
 - III. Sustainable Landscapes (biodiversity, pollinator protection)
 - IV. Tree Canopy (tree canopy and forest maintenance and management)
 - V. Water Resources (protecting water resources)

As humans, we benefit immensely from the resources created by our environment. With changing climatic conditions, it is important to help protect the wildlife and natural systems around us. Rising temperatures and changes in rainfall threaten the ecosystems of Durham and the habitats of the region’s wildlife. While the goals and actions within this section do not reduce Durham’s GHG emissions, they are vital in ensuring Durham’s continued resilience in the face of climate impacts.

| Goal NR.1 – Natural Resources | | Reduction Potential 2024 | Reduction Potential 2030 |
|---|--|--------------------------|--------------------------|
| Increase the amount of municipal-owned land that meets the Conservation/Open Space Land criteria by 2024. | | Not Applicable* | |
| Action Number | Action | Lead Actor | Metric |
| NR.1.1 | Acquire 36 acres of Pike Property by 2024. | Administrator’s Office | Property acquired |
| NR.1.2 | Evaluate other eligible parcels consistent with the abovementioned guidelines by 2024. | Administrator’s Office | Evaluation completed |

**The Conservation/Open Space Land document outlines the Town’s procedures for acquiring land for conservation or open space purposes. While this does not reduce Durham’s GHG emissions, the intent is to protect natural resources, enhance public access to open space and nature-oriented recreational opportunities, maintain Durham’s prominent scenic view sheds, and build upon, create, and connect unfragmented conservation land.*

| Goal NR.2 – Natural Resources | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|---|-------------------------------|--------------------------|
| Maintain Durham’s capability of sequestering carbon through land use practices through 2024. | | Not Applicable** | |
| Action Number | Action | Lead Actor | Metric |
| NR.2.1 | Partner with UNH to incorporate an educational campaign about the importance of land sequestration and best land use practices by 2024. | Land Stewardship Subcommittee | Campaign completed |

***Although this is good for context, forests and trees should not be considered as direct carbon offsets in climate mitigation efforts because doing so underestimates the actual reductions communities need to make to meet reduction targets. In addition to this, carbon sequestration is part of the earth’s natural carbon cycle that regulates climate and makes the planet habitable. Therefore, associating all carbon sequestration with offsetting anthropogenic emissions disregards this natural balance, and again underestimates Durham’s emissions.*

| Goal NR.3 – Natural Resources | | Reduction Potential 2024 | Reduction Potential 2030 |
|--|--|--------------------------|--|
| Support UNH’s goal of reducing Scope 1 and 2 emissions by 50% by 2030. | | Not Estimated*** | 967.5 tCO ₂ e |
| Action Number | Action | Lead Actor | Metric |
| NR.3.1 | Partner with UNH to identify opportunities for the Town to support UNH emission-reduction initiatives by 2024. | Sustainability Fellow | Partnership established and opportunities determined |

****Due to this being a longer-term (i.e., 2030) goal, and considering emission-reduction techniques are likely to have a non-linear impact on emissions, it is difficult to estimate this goal’s anticipated progress for 2024 at this time.*

Plan Implementation

Implementing the actions outlined in this plan will be a continuous process the town is undertaking with UNH, the energy committee, the integrated waste management advisory committee, the conservation commission, the agricultural commission, the administrator’s office, and the town council.

Durham is required under the Global Covenant of Mayors to provide regular updates to its Climate Action Plan, Community-Wide Greenhouse Gas Inventory, and Climate Risk and Vulnerability Assessment. This is a voluntary community plan around implementation. Homeowners/businesses are not required to comply.

| Monitoring Report Component | Timeline | Next Report Due |
|--|---------------|-------------------|
| Climate Action Plan: Report any changes to the overall strategy as well as the implementation status (completed, in progress, on hold) of key actions and update their impacts. | Every 2 years | December 31, 2024 |
| GHG Emissions Inventories: Provide updated GHG emissions data for the reporting year. | Every 2 years | December 31, 2024 |
| Climate Risk and Vulnerability Assessment: Provide updates on goal progress for the reporting year. | Every 2 years | December 31, 2024 |

Appendix I: GHG Reduction Calculations

Below is a summary table of the estimated maximum GHG reductions by 2024 and 2030 for each goal. These numbers were calculated based on assumptions that are included in the calculations following the table.

| Goal/Action | Estimated Maximum GHG reductions by 2024 (tCO ₂ e) | Estimated Maximum GHG reductions by 2030 (tCO ₂ e) |
|--|---|---|
| Buildings | | |
| B.1 – In residential and commercial buildings, electrify stationary energy sources and increase energy efficiency to compensate for this increased energy demand by 2030. <ul style="list-style-type: none"> ○ B.1.1 – Incorporate an educational campaign about energy efficiency/reduction opportunities in existing residential buildings by 2024. ○ B.1.2 – Identify ways to gather Town-level, rather than current county-level, residential energy data to estimate the impact of energy efficiency initiatives by 2024. | Not Estimated | 16,151 (18.44%) |
| B.2 – Diversify Durham’s housing stock by 2030. <ul style="list-style-type: none"> ○ B.2.1 – Evaluate changes needed in Durham (ex: zoning and other means) to allow for a broader variety of modestly sized, affordably-priced, energy-efficient housing types that are proximate to the urban core by 2024. | Not Applicable | Not Applicable |
| B.3 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. <ul style="list-style-type: none"> ○ B.3.1 – Partner with UNH to identify opportunities for the Town to support UNH emission-reduction initiatives by 2024. | Not Estimated | 9,115.05 (10.41%) |
| Transportation | | |

| | | |
|--|---------------------------|---|
| <p>T.1 – Transition 70% of the police fleet to hybrid vehicles by 2024, and 100% of municipal vehicles to hybrid or electric vehicles by 2030, as technology and the market allows.</p> <ul style="list-style-type: none"> ○ T.1.1 – Purchase new hybrid police vehicles to replace old vehicles on an annual basis, and continue to filter vehicles downward for uses by other departments ○ T.1.2 – Review hybrid and electric vehicle options in the market for all other municipal vehicles on an annual basis. Reevaluate action by 2024. | <p>38.08 (0.04%)</p> | <p>54.40 (0.06%)</p> |
| <p>T.2 – Increase bicycle connectivity to the downtown core and enhance the safe pedestrian experience by 2024.</p> <ul style="list-style-type: none"> ○ T.2.1 – Install 6500 feet (1.23 miles) of bike-sharing lanes on Madbury Road by 2024. ○ T.2.2 – Evaluate how the municipal, university, and NGO trails can be better connected to Durham’s downtown by 2024. | <p>196.29 (0.22%)</p> | <p>196.29 (0.22%) unless the 2030 goal is set</p> |
| <p>T.3 – Reduce single-occupancy vehicle miles traveled by 10% by 2024.</p> <ul style="list-style-type: none"> ○ T.3.1 – Partner with UNH to locate increased graduate housing stock close to campus by 2024. ○ T.3.2 – Partner with UNH to evaluate how the Wildcat bus service can better serve Durham residents by 2024. ○ T.3.3 – Partner with UNH to incorporate an educational campaign about active/public transportation options by 2024. | <p>3,304 (3.77%)</p> | <p>3,304 (3.77%) unless 2030 goal is set</p> |
| <p>T.4 – Increase the share of electric vehicles and number of public charging stations in Durham by 2030.</p> <ul style="list-style-type: none"> ○ T.4.1 – Incorporate public input to identify areas to install public charging stations by 2024. ○ T.4.2 – Identify local, state, and federal incentives for both electric vehicle ownership and charging station installation for community usage by 2024. | <p>Not Estimated</p> | <p>Not Estimated.</p> |
| <p>T.5 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030.</p> <ul style="list-style-type: none"> ○ T.5.1 – Partner with UNH to identify opportunities for the Town to support UNH emission-reduction initiatives. | <p>Not Estimated</p> | <p>949.7 (1.05%)</p> |
| Energy Supply | | |
| <p>E.1 – Provide the option of 100% renewable energy source for all residents by 2024.</p> <ul style="list-style-type: none"> ○ E.1.1 – Update Durham’s solar ordinance to provide Durham residents clearer guidance by 2024. ○ E.1.2 – Participate in Community Power Program and provide a 100% renewable energy option by 2024. ○ E.1.3 – Incorporate an educational campaign about green energy opportunities in residential buildings by 2024. | <p>6081.3 (6.94%)</p> | <p>6081.3 (6.94%) unless 2030 goal is set</p> |
| <p>E.2 – Source all municipal buildings from 100% renewable energy by 2024.</p> | <p>690.1 (0.79%)</p> | <p>690.1 (0.79%)</p> |

| | | |
|--|---|---|
| <ul style="list-style-type: none"> ○ E.2.1 – Purchase PPA2 (power purchase agreement 2) by the end of 2024. | | |
| <p>E.3 – Ensure an adequate renewable energy supply while accounting for increased demand from the transportation sector and impacts from climate change by 2030.</p> <ul style="list-style-type: none"> ○ E.3.1 – Evaluate expected changes to energy supply based on an increase in energy demand from electrification (electric vehicles, etc.) by 2024. | Not Applicable | Not Applicable |
| Solid Waste and Resource Consumption | | |
| <p>SW.1 – Reduce the tonnage, and send it to the landfill by 10% per household by 2024 with the goal over time of meeting and exceeding the NH state diversion rates.</p> <ul style="list-style-type: none"> ○ SW.1.1 – Incorporate an educational campaign about waste reduction and diversion opportunities by 2024. ○ SW.1.2 – Implement a Durham-wide compost program by 2024. | 24.7 (0.03%) | 24.7 (0.03%) unless 2030 goal is set |
| Natural Resources | | |
| <p>NR.1 – Increase the amount of municipal-owned land that meets the Conservation/Open Space Land criteria by 2024.</p> <ul style="list-style-type: none"> ○ NR.1.1 – Acquire 36 acres of Pike Property by 2024. ○ NR.1.2 – Evaluate other eligible parcels consistent with the abovementioned guidelines by 2024. | Not Applicable | Not Applicable |
| <p>NR.2 – Maintain Durham’s capability of sequestering carbon through land use practices through 2024.</p> <ul style="list-style-type: none"> ○ NR.2.1 – Partner with UNH to incorporate an educational campaign about the importance of land sequestration and best land use practices by 2024. | Not Applicable | Not Applicable |
| <p>NR.3 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030.</p> <ul style="list-style-type: none"> ○ NR.3.1 – Partner with UNH to identify opportunities for the Town to support UNH emission-reduction initiatives by 2024. | Not Estimated | 967.5 (1.07%) |
| Total | 10,334.47 (11.79%) (excluding “TBD”) | 37,534.04 (42.78%) (excluding “TBD”) |

Calculations and Assumptions

Total 2019 emissions (excluding land use): 87,566 tCO₂e

Buildings

B.1 – In residential and commercial buildings, electrify stationary energy sources and increase energy efficiency to compensate for this increased energy demand by 2030.

2019 GHG Inventory findings (stationary fuel emissions only):

| Sector | Emissions (tCO ₂ e) |
|-------------|--------------------------------|
| Commercial | 8,622.7 |
| Residential | 7,528.3 |
| Total | 16,151.0 |

2024 calculations:

Not estimated because it is a 2030 goal.

2030 calculations:

Up to 16,151 tCO₂e reduction assumes 100% electrification, which would equate to 18.44% of 2019 emissions excluding land use.

B.2 – Diversify Durham’s housing stock by 2030.

GHG reductions are not applicable.

B.3 – Support UNH’s goal of reducing Scope 1 and 2 emissions by 50% by 2030.

2019 GHG Inventory findings (UNH building emissions only):

| Sector | Emissions (tCO ₂ e) |
|-----------------|--------------------------------|
| Stationary Fuel | 16,286.6 |
| Electricity | 1,943.5 |
| Total | 18,230.1 |

2024 calculations:

Not estimated because it is a 2030 goal.

2030 calculations:

$18,230.1 * 0.5 = 9,115.05$ tCO₂e reduction (10.41% of 2019 emissions excluding land use)

Transportation

T.1 – Transition 70% of police fleet to hybrid vehicles by 2024, and 100% of municipal vehicles to hybrid or electric vehicles by 2030, as technology and the market allows.

2019 GHG Inventory findings:

2019 gasoline usage by police fleet: 15,673 gallons (136 tCO₂e)

In addition, a 2021 report comparing hybrid v. gasoline police vehicles found a 40% reduction in gas usage in hybrid vehicles.

2024 calculations (police vehicles only):

15,673 gallons * 0.4 * 0.7 = 4388.44 gallons

136 tCO_{2e} * 0.4 * 0.7 = 38.08 tCO_{2e} (0.04% of 2019 emissions excluding land use)

2030 calculations (police vehicles only):

15,673 gallons * 0.4 = 6269.2 gallons

136 tCO_{2e} * 0.4 = 54.40 tCO_{2e} (0.06% of 2019 emissions excluding land use)

T.2 – Increase bicycle connectivity to the downtown core and enhance the safe pedestrian experience by 2024.

2024 calculations:

Estimated to reduce 2019 transportation emissions (39,258 tCO_{2e}) by approximately 0.5%, or 196.29 tCO_{2e}, thus reducing total 2019 emissions (excluding land use) by approximately 0.22%.

2030 calculations:

Assumed to be the same as 2024 until a 2030 goal is established.

T.3 – Reduce single-occupancy vehicle miles traveled by 10% by 2024.

2019 GHG Inventory findings:

| | Vehicle Miles Traveled (VMT) | Emissions (tCO _{2e}) |
|---------------------|------------------------------|--------------------------------|
| Light duty vehicles | 80,332,448 | 32,492 |
| Motorcycles | 2,776,819 | 548 |
| Total | 83,109,267 | 33,040 |

2024 calculations:

10% reduction: 8,310,926.7 VMT, or 3,304 tCO_{2e} (3.77% of total 2019 emissions excluding land use)

2030 calculations:

Assumed to be the same as 2024 until a 2030 goal is established.

T.4 – Increase the share of electric vehicles and the number of public charging stations in Durham by 2030.

2024 calculations:

We are not estimating this because it is impossible to accurately estimate given available data/limitations.

2030 calculations:

Not estimated.

| |
|---|
| T.5 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030. |
| <p><u>2019 GHG Inventory findings (UNH transportation emissions only):</u> UNH’s total fleet-related emissions in FY19 were 1998 MTCDE, and a UNH analysis suggested that 4.9% of those emissions were for WildCat Transit travel outside of Durham, making the UNH transportation emissions from the Durham FY19 GHG inventory 1899.3 MTCDE.</p> <p><u>2024 calculations:</u> Not estimated because it is a 2030 goal.</p> <p><u>2030 calculations:</u> UNH proposes to meet a 50% reduction from FY19 levels by 2030; success would result in reductions of 950 MTCDE (.5*1899.3).</p> |

Energy Supply

| |
|--|
| E.1 – Provide the option of 100% renewable energy source for all residents by 2024. |
| <p><u>2019 GHG Inventory findings:</u> Residential electricity GHG emissions: 6081.3 tCO₂e</p> <p><u>2024 calculations:</u> Up to 6,081.3 tCO₂e reduction (6.94% of 2019 emissions excluding land use) if all residential buildings adopt a 100% renewable energy source.</p> <p><u>2030 calculations:</u> Assumed to be the same as 2024 until a 2030 goal is established.</p> |
| E.2 – Source all municipal buildings from 100% renewable energy by 2024. |
| <p><u>2019 GHG Inventory findings:</u> Municipal stationary fuel GHG emissions: 193.0 tCO₂e Municipal electricity GHG emissions: 497.1 tCO₂e Total municipal GHG emissions from energy: 690.1 tCO₂e</p> <p><u>2024 calculations:</u> Up to 690.1 tCO₂e reduction (0.79% of 2019 emissions excluding land use)</p> <p><u>2030 calculations:</u> Assumed to be the same as 2024 until a 2030 goal is established.</p> |

E.3 – Ensure an adequate renewable energy supply while accounting for increased demand from the transportation sector by 2030.

GHG reductions are not applicable.

Solid Waste and Resource Consumption

SW.1 – Reduce the tonnage, and send it to the landfill by 10% per household by 2024 with the goal over time of meeting and exceeding the NH state diversion rates.

2019 GHG Inventory findings:

Number of households: 2,240

Landfilled waste: 1,573 short tons (0.70 short tons/household)

Landfilled waste emissions: 247 tCO₂e (0.11 tCO₂e/household)

2024 calculations:

Landfilled waste 10% reduction: 157.3 short tons (0.07 short tons/household)

Landfilled waste 10% emissions reduction: 24.7 tCO₂e (0.011 tCO₂e/household) (0.03% of 2019 emissions excluding land use)

2030 calculations:

Assumed to be the same as 2024 until a 2030 goal is established.

Natural Resources

NR.1 – Increase the amount of municipal-owned land that meets the Conservation/Open Space Land criteria by 2024.

GHG reductions are not applicable.

NR.2 – Maintain Durham’s capability of sequestering carbon through land use practices through 2024.

GHG reductions are not applicable.

NR.3 – Support UNH’s goal of reducing their Scope 1 and 2 emissions by 50% by 2030.

2019 GHG Inventory findings (UNH building emissions only):

Agriculture/Livestock emissions: 1,935 tCO₂e

2024 calculations:

Not estimated because it is a 2030 goal.

2030 calculations:

$1935 * 0.5 = 967.5$ tCO₂e reduction (1.10% of 2019 emissions excluding land use)

Appendix II: Business-As-Usual Calculations

We calculated the Business-As-Usual scenario for Durham based on the current and anticipated emissions created on a per capita basis.

In 2019, Durham emitted 87,566 tCO₂e (excluding land use). Its 2020 population, per the US census, was 15,490, resulting in per capita emissions of approximately 5.65 tCO₂e/person.

Assuming that per capita emissions would stay constant, we calculated Business-As-Usual emissions based on the estimated population growth estimates included in Durham’s 2015 Master Plan. Because the difference between the 2020 expected population and the 2020 US census population was 525 persons, we adjusted the population growth rates by that amount up through 2040. The Master Plan did not estimate population growth through 2050. For simplifying purposes, we assumed the same growth rate for 2040-2050 as for 2020-2040, which was approximately 560 persons per decade, or 280 persons per 5 years. The table below shows the expected and adjusted populations as well as the Business-As-Usual emissions.

| Year | 2015 Calculated Population | 2020 Adjusted Population | Business-As-Usual Emissions, Adjusted Population (tCO ₂ e) |
|------|----------------------------|--------------------------|---|
| 2019 | N/A | N/A | 87,566 |
| 2020 | 16,015 | 15,490 (US census) | 87,566 (2019 GHG inventory) |
| 2025 | 16,387 | 15,788 | 89,669 |
| 2030 | 16,720 | 16,195 | 91,552 |
| 2035 | 16,983 | 16,458 | 93,039 |
| 2040 | 17,134 | 16,609 | 93,892 |
| 2045 | N/A | 16,889 | 95,475 |
| 2050 | N/A | 17,169 | 97,058 |